PHOTO-MESON PRODUCTION FROM A SINGLE NUCLEON

BY

FREDA SALZMAN

B.S., Brooklyn College, 1949
M.S., University of Illinois, 1951

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SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
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PHOTO-MESON PRODUCTION FROM A SINGLE NUCLEON

The photo-pion production from a single nucleon is calculated, using the no nucleon recoil, low momentum cut-off theory of Chew[1]. In this model, the electro-magnetic interaction arises only from the motion of the charged pions and the meson-nucleon interaction occurs only in the P-state. The photo-pion process then consists of the nucleon emitting a charged pion which upon annihilating the incident photon is scattered into a "real" particle scattering state.

The meson-nucleon system is treated in the modified Dancoff approximation which Chew[1] used in the pion-nucleon scattering problem. In the photo-pion process, this approximation takes into account all the secondary scatterngs of the escaping pion by the nucleon, such that each virtual meson is in the field by itself during some part of its existence. The single momentum cut-off and the coupling constant used are those obtained by Chew[1] in fitting the pion-nucleon scattering data.

It is found that the magnitude of the charged poin production and the angular distribution of the neutral production agree fairly well with experiment. However, the magnitude of the neutral production is too low and the angular distribution of the charged does not agree with experiment. Both of these failures of the theory can be attributed to insufficient secondary interaction of the outgoing pion with the nucleon.

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1. G. F. Chew, Phys. Rev. 89, 591 (1953).

VITA

Freda Salzman was born on May 12, 1927 in Brooklyn, New York. After graduating from New Utrecht High School in 1944, she entered the Evening Session of Brooklyn College which she attended for one semester. In February, 1946 she entered the Day Session of Brooklyn College and received the degree of Bachelor of Science, with honors, from that institution in June, 1949. She entered the Graduate College of the University of Illinois in September, 1949. Since February, 1951 she has held either a University Fellowship or Research Assistantship.